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OTHER MATTERS

Report on the workshop on the new UNFCCC reporting guidelines on annual inventories and options to address challenges facing Annex I Parties with economies in transition in preparing greenhouse gas inventories

Note by the secretariat

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I. INTRODUCTION

A. Mandate

1. The Subsidiary Body for Scientific and Technological Advice (SBSTA), at its tenth session, encouraged Parties included in Annex I to the Convention to support the efforts of those Annex I Parties with economies in transition aimed at improving the quality of their national greenhouse gas inventories, including the reporting of inventory data using the common reporting format and the archiving of the inventory data (FCCC/SBSTA/1999/6, para. 27 (c)). It also requested the secretariat, taking into account the advice of the Intergovernmental Panel on Climate Change (IPCC) and other relevant organizations, to develop the software tools needed to facilitate reporting by Parties using the common reporting format (FCCC/SBSTA/1999/6, para. 27 (f)).

2. At its eleventh session, the SBSTA noted the need to improve the quality of national greenhouse gas inventories of Annex I Parties with economies in transition, and of the reporting of inventory data using the UNFCCC reporting guidelines on annual inventories. In this regard, the SBSTA welcomed the offer of support by the Government of Switzerland for a workshop on issues relating to greenhouse gas inventories of Annex I Parties with economies in transition to be held in Geneva from 30 November to 2 December 1999 (FCCC/SBSTA/1999/14, para. 37 (b)).

3. The SBSTA requested the secretariat to prepare a report on the workshop, including information on the special needs of the Annex I Parties with economies in transition, for consideration by the SBSTA at its twelfth session (FCCC/SBSTA/1999/14, para. 37 (c)).

B. Scope of the note

4. This document is intended to respond to the request of the SBSTA for a report on the workshop, as noted in paragraph 3 above.

II. PROCEEDINGS

5. The United Nations Institute for Training and Research (UNITAR) organized the workshop in close cooperation with the UNFCCC secretariat. The workshop was held in Geneva from 30 November to 2 December 1999 with the financial support of the Government of Switzerland. It focused on the new UNFCCC reporting guidelines on annual inventories, in particular on the revised common reporting format (CRF), and on options to address challenges facing Annex I Parties with economies in transition in preparing greenhouse gas inventories. The agenda of the workshop is presented in the annex to this report.

6. In total, 51 country and organization representatives, most of whom were inventory experts, attended the workshop. Out of this total, 26 were nominated by Annex I Parties with economies in transition and 10 were nominated by 8 Annex II Parties. In addition, 15 experts

from UNITAR, the IPCC National Greenhouse Gas Inventories Programme, the Organisation for Economic Co-operation and Development (OECD), the International Energy Agency (IEA), the European Environment Agency (EEA), the International Register of Potentially Toxic Chemicals (IRPTC) and the World Business Council for Sustainable Development attended the workshop.

7. The workshop was chaired by Mr. Gao Pronove, Senior Programme Coordinator, CC: TRAIN/ UNITAR, in cooperation with Mr. Vitaly Matsarski, Manager of the Annex I Implementation Subprogramme of the UNFCCC secretariat. The chairman opened the workshop by welcoming the participants and recalling the relevant SBSTA conclusions related to the workshop.

8. Mr. Jose Romero from Switzerland welcomed all participants on behalf of the Swiss Government. He emphasized the importance of accurate and reliable greenhouse gas inventory data in order to ensure the credibility of both the Convention and the Kyoto Protocol. Mr. Andrej Kranjc (Slovenia) (Rapporteur of the SBSTA) recalled the efforts of Annex I Parties with economies in transition in submitting greenhouse gas inventories and stressed the need for closer cooperation between all Annex I Parties in addressing common reporting problems. Mr. Sal Emmanuel, Head of the Technical Support Unit of the IPCC National Greenhouse Gas Inventories Programme, provided information on the current IPCC work related to inventories, in particular the development of the good practice guidance and uncertainty management for greenhouse gas inventories.

9. The workshop comprised two parts. The first part concentrated on issues related to the new UNFCCC reporting guidelines on annual inventories and the second part dealt with the options to address the challenges facing Annex I Parties with economies in transition in preparing greenhouse gas inventories.

10. During the first part of the workshop, the participants were informed of the rationale for the development of the new UNFCCC reporting guidelines on annual inventories and the CRF and of the implications for Annex I Parties with economies in transition. A presentation was made on the development of a software tool to facilitate the submission of data according to the CRF and the participants were given an opportunity to use the latest version of the tool.

11. The participants were informed about the progress of the work of the European Environment Agency on the development of its software package, CollectER/ReportER. They were also provided with information about the ongoing work of the World Business Council for Sustainable Development related to the development of an internationally accepted measurement and reporting standard for corporate greenhouse gas emissions.

12. During the second part of the workshop, the representatives from Annex I Parties with economies in transition presented information on the current challenges encountered in the preparation of national greenhouse gas inventories and any options to address them. Thirteen presentations, including written papers, were made. All of these papers and a synthesis report on the views of Annex I Parties with economies in transition are available on the web site of UNITAR (www.unitar.org/cctrain/eit).

13. Following these presentations, representatives from Annex II Parties addressed the meeting. They expressed their support for the aims of the workshop and indicated that they would communicate to their governments the results of the workshop. They also reiterated their willingness to further cooperate with their counterparts in Annex I Parties with economies in transition in order to address common and individual challenges in preparing greenhouse gas inventories.

III. CONCLUSIONS

A. Conclusions related to the new UNFCCC reporting guidelines

14. The participants discussed the new requirements related to the submission of inventory data in the common reporting format. They were of the opinion that these new requirements represent a positive development that would improve the quality of national inventories. They concluded that the 2000-2001 trial period should facilitate the identification of further needs and actions required for preparing high quality greenhouse gas inventories.

15. They urged the secretariat to facilitate the reporting of annual inventories using the common reporting format by making available the appropriate software as soon as practicable, but no later than in January 2000. This would allow for the timely submission of the annual inventory due by 15 April 2000. They requested the secretariat to make this software as user-friendly as possible. The participants also suggested that the secretariat should consider further work on the IPCC software, such as the development of a software tool for exporting data included in the IPCC software into the appropriate CRF tables.

16. The participants welcomed other information presented at the workshop and related to inventory preparation and data processing provided by the UNFCCC secretariat, the IPCC National Greenhouse Gas Inventories Programme and other organizations. The representatives of Annex I Parties with economies in transition stressed the need to be fully informed of all latest developments in the field of inventory preparation, in particular of the ongoing IPCC work on good practices.

B. Conclusions related to the challenges facing Annex I Parties with economies in transition in preparing greenhouse gas inventories

17. The participants concluded that Annex I Parties with economies in transition face a number of problems related to the preparation and timely submission of annual greenhouse gas inventories. Requirements related to the submission of inventory data using the common reporting format pose additional challenges. Among them the following were mentioned frequently:

(a) Lack of financial, material and human resources needed for uninterrupted work of national inventory teams, as well as lack of required equipment;

(b) Insufficient institutional frameworks, including lack of cooperation between relevant organizations;

(c) Insufficient training of staff, scarce information on the latest developments;

(d) Problems with collecting statistical data in general, and in the energy sector and for hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) in particular:

(i) Need for closer links with the IPCC National Greenhouse Gas Inventories Programme, UNFCCC secretariat, UNITAR, OECD, IEA and the EEA; and

(ii) Limited funds for research related to country-specific problems, including emission factors and estimates of uncertainty.

18. All participants from Annex I Parties with economies in transition emphasized their willingness to continue to cooperate among themselves and with experts from Annex II Parties and to continue to work together with the relevant international organizations. In this regard, they expressed their appreciation for the assistance and support they have received so far from Annex II Parties and international organizations.

19. They also stressed that, despite their willingness to fulfil the commitments under the Convention, their efforts at the national level may not be sufficient and there is a need for additional coordinated external assistance provided through appropriate bilateral and multilateral channels.

C. Conclusions on cooperation with Annex II Parties and international organizations

20. The participants took note of the SBSTA conclusions that efforts to improve the quality of greenhouse gas inventories in these countries should be supported by Annex II Parties through bilateral and multilateral assistance. In this context, the participants suggested that a medium- or long-term cooperation programme could be developed. This programme might serve as a framework for the coordination of all activities aimed at providing assistance to Annex I Parties with economies in transition in an efficient manner.

21. They encouraged Annex II Parties to take into account the specific national circumstances of individual Annex I Parties with economies in transition when developing proposals for greenhouse gas inventory assistance.

22. They encouraged the representatives from Annex II Parties attending the workshop to communicate to their governments the challenges identified by the representatives from Annex I Parties with economies in transition in improving the quality of greenhouse gas inventories and in establishing their national systems.

23. They concluded that some of the most urgent challenges facing Annex I Parties with economies in transition may be addressed either through the establishment of direct bilateral tie between Annex II Parties and Annex I Parties with economies in transition, or through multilateral activities. Bilateral activities could include, *inter alia*:

(a) Provision of financial and technical assistance for ensuring the ongoing work of national teams in charge of preparing greenhouse gas inventories;

(b) Provision of financial and technical assistance for preparing, processing, and archiving inventory and related data;

(c) Sharing of results of relevant research leading to possible improvements in greenhouse gas inventories;

while multilateral activities could include, *inter alia*:

(a) Disseminating the IPCC 1996 Revised Guidelines and the IPCC good practice guidance materials to Annex I Parties with economies in transition;

(b) Training experts from Annex I Parties with economies in transition in the application of good practice guidance and of the IPCC 1996 Revised Guidelines; and

(c) Preparing a comprehensive data collection plan to meet the requirements of the UNFCCC reporting guidelines in particular areas, for example the energy sector, and the fluorinated compounds (HFCs, PFCs and SF_6)

24. They identified the need to keep the experts and the authorities in charge of inventory preparation informed of the latest developments in inventory preparation. To address this need the participants encouraged the IPCC TFI and the Technical Support Unit and also the Europea Environment Agency and the UNFCCC secretariat to:

(a) Communicate to all Parties, and particularly technical experts from Annex I Parties with economies in transition, information about current inventory activities an any new guidance, in a timely and regular manner;

(b) Make efforts to involve a larger number of Annex I Parties with economies in transition in relevant workshops, meetings and technical conferences;

(c) Provide technical assistance to Annex I Parties with economies in transition by maintaining easily accessible problem-solving services ("helpdesk").

25. They encouraged the IEA to assist Annex I Parties with economies in transition in ensuring that their national data systems in the energy sector are consistent with the IPCC Guidelines by:

(a) Providing energy-related data for the purposes of comparison with national energy balances;

(b) Assisting countries, subject to the availability of funds, to adapt their statistical systems to meet the requirements of the IPCC Guidelines. Annex I Parties with economies in transition are encouraged to take advantage of the expertise of the IEA in this field and to initiate contacts with the IEA for this purpose.

26. They recommended that the present conclusions should be conveyed to the Annex I Expert Group supported by the OECD/IEA, to be considered at its next meeting in February 2000.

27. They suggested that the Annex I Expert Group and the OECD consider the possibility of expanding their roles in supporting the efforts of Annex I Parties with economies in transition in preparing national greenhouse gas inventories.

28. They encouraged multilateral organizations and Annex II Parties to take advantage of the capabilities of UNITAR for organizing technical training and technical workshops in organizing capacity-building activities on greenhouse gas inventory preparation and other related issues for experts of Annex I Parties with economies in transition.

Annex

AGENDA
Day 1

9:00 - 9:30	Registration
9:30 - 10:30	Opening presentations: Mr. Vitaly Matsarski, Manager of the Annex I Implementation Subprogramme, UNFCCC secretariat Mr. Jose Romero, representative of Switzerland Mr. Andrej Kranjc, representative of Slovenia (Rapporteur of the SBST Mr. Sal Emmanuel, Director of the Technical Support Unit of the National Greenhouse Gas Inventories Programme, IPCC Mr. Gao Pronove, Senior Programme Coordinator, CC: TRAIN/UNITA
10:30 - 11:00	Coffee break
11:00 - 11:30	"The new UNFCCC reporting guidelines on annual inventories. What i new? National inventory report. Common reporting format. Implicatio for the EIT Parties. *Trial period*" Mr. Roberto Acosta, UNFCCC secretariat
11:30 - 12:00	"Common reporting format (CRF) *Rationale, Element*" Ms. Sevdalina Todorova – Energoproekt, Bulgaria
12:00 - 13:00	Discussion
13:00 - 14:30	Lunch
14:30 - 17:00	"Software tool to facilitate the completion of the CRF. Explanation and practical examples" (working session with computers) Ms. Lyn Rudder, UNFCCC secretariat
17:00 - 17:15	"Guidelines for the technical review of GHG inventories of Annex I Parties" Mr. Stylianos Pesmajoglou, UNFCCC secretariat
17:15 - 17:30	"Basic elements on national systems for the estimation of GHG emission and removals under Article 5.1 of the Kyoto Protocol" Mr. Roberto Acosta, UNFCCC secretariat
17:30 - 18:00	Discussion
18:00 - 19:00	Optional training on software tool to facilitate the completion of the CRF

Day 2

9:00 - 10:30	General discussion on the new UNFCCC reporting guidelines on annual inventories
10:30 - 11:00	Coffee break
11:00 - 11:30	"CollectER, ReportER (CORINAIR software)" Mr. Tinus Pulles and Mr. Jozef Skakala, European Topic Center on Air Emissions (ETC/AE)
11:30 - 12:00	"IPCC software" Mr. Thomas Martinsen, National Greenhouse Gas Inventories Programme, IPCC
12:00 - 12:30	Discussion on possible linkages between the IPCC and CORINAIR software with the CRF
12:30 - 13:00	"Developing an internationally accepted measurement and reporting standard for corporate GHG emissions" Mr. Jasper Koch and Ms. Kaja Kummer - World Business Council for Sustainable Development
13:00 - 14:30	Lunch
14:30 - 19:00	Presentation by countries of existing challenges in preparing national GHG inventories (15 minutes by each EIT country)

Day 3

9:00 - 9:15	"Challenges EIT Parties meet when preparing annual GHG inventories", summary report Ms. Sevdalina Todorova, Consultant, UNITAR
9:15 - 9:30	"Support programme for national inventory systems of Annex I Parties with EIT" Mr. Gao Pronove, Senior Programme Coordinator, CC: TRAIN/UNITAR
9:30-11:00	Discussion on existing challenges in the preparation of national GHG inventories and identification of main options to address identified needs. Representatives of Canada, Finland, France, Ireland, USA, IPCC, OECD, EEA, IEA
11:00-11:30	Break
11:30-12:45	Conclusions and final discussion
12:45-13:00	Closing remarks Mr. Dennis Tirpak, Coordinator of the Science and Technology Programme, UNFCCC

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SUBSIDIARY BODY FOR SCIENTIFIC AND TECHNOLOGICAL ADVICE
Twelfth session
Bonn, 12-16 June 2000
Item 9 (a) of the provisional agenda

DEVELOPMENT AND TRANSFER OF TECHNOLOGIES

STATUS OF THE CONSULTATIVE PROCESS (DECISION 4/CP.4)

Report of the Asia and the Pacific regional workshop on the transfer of technology consultative process Cebu, the Philippines, 17-19 January 2000

Note by the Chairman

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I. INTRODUCTION

A. Mandate

1. By its decision 4/CP.4, the Conference of the Parties (COP) requested the Chairman of the Subsidiary Body for Scientific and Technological Advice (SBSTA) to establish a consultative process to consider the list of issues and questions contained in the annex to that decision, as well as any additional issues and questions subsequently identified by Parties, and to make recommendations on how they should be addressed in order to achieve agreement on a framework for meaningful and effective actions to enhance implementation of Article 4.5 of the Convention (FCCC/CP/1998/16/Add.1).

2. At its tenth session, the SBSTA endorsed the proposal by the Chairman that the secretariat organize three regional workshops, one in Africa, one in Asia and the Pacific, and one in Latin America and the Caribbean. It invited the Chairman, with the assistance of the secretariat, to complete the regional workshops by early 2000, and to report to the SBSTA at its twelfth session, with a view to taking a decision by COP 6 (FCCC/SBSTA/1999/6, para. 69 (c) and (d)).

B. Scope

3. This note presents the report of the Asia and the Pacific regional workshop on the transfer of technology consultative process, held in Cebu, the Philippines, from 17 to 19 January 2000. It contains a summary of the workshop presentations and the panel and general discussions, as well as the outcomes of three parallel working groups. The workshop was organized by the secretariat with the kind assistance of the Government of the Philippines.

4. A seminar organized by the Climate Technology Initiative (CTI) in cooperation with the UNFCCC secretariat was held from14 to15 January 2000 back-to-back with the UNFCCC workshop. The objectives of the CTI seminar were to enhance the understanding of the role of the private sector in the diffusion of environmentally-sound technologies, know-how and practices ("ESTs") and to report the findings to the UNFCCC consultative process. The report of this seminar is contained in the annex to the present note.

5. This note should be read in conjunction with the report of the African regional workshop held in Arusha, United Republic of Tanzania, from 16 to 18 August 1999 (FCCC/SBSTA/1999/11), the report of the Latin America and the Caribbean regional workshop organized in San Salvador, El Salvador, from 29 to 31 March 2000 (FCCC/SBSTA/2000/INF.6), and the Chairman's note on the progress of the consultative process (FCCC/SBSTA/2000/4).

6. The report of the Asia and the Pacific regional workshop was prepared by the Chairman, with the assistance of the secretariat, taking into account all presentations by country representatives and experts, country reports and discussions at the workshop. Several ideas on possible elements of a framework for meaningful and effective action to enhance the implementation of Article 4.5 of the Convention were suggested in the working groups and the

final session of the workshop. As these preliminary ideas emerged, the Chairman did not attempt to hold a debate or reach agreement among participants on the appropriateness, practicability or acceptability of these ideas or on how such ideas relate to a framework. With this understanding, the suggested possible elements of a framework as presented in this report are viewed as a list of thoughts and ideas that can serve as input to further discussions and negotiations in the consultative process.

II. REPORT OF THE ASIA AND THE PACIFIC REGIONAL WORKSHOP ON THE TRANSFER OF TECHNOLOGY CONSULTATIVE PROCESS

A. Introduction

7. Representatives of Parties attending the workshop had the opportunity to provide information in the form of a "country paper".[1] These papers provide detailed information on issues related to the transfer of technology specific to each country including: technology needs, technology transfer activities, mechanisms for technology transfer, and possible elements of a framework for meaningful and effective action.

8. The agenda of the workshop was designed, in consultation with the Chairman of SBSTA and Parties from the Asia and the Pacific region, to address the issues and questions contained in the annex to decision 4/CP.4 and to follow up on progress made at the African regional workshop held in August 1999.

9. The workshop was attended by 72 participants, including 31 from non-Annex I Parties, representing Asia and the Pacific (29), Africa (1), and Latin America and the Caribbean (1). Eighteen representatives from Annex I Parties also participated in the workshop. Eight intergovernmental organizations were represented and seven non-governmental organizations. Four representatives of the private sector from both developed and developing countries also attended.

10. The objectives of the workshop were to generate and share information on the special situations and needs of countries in the Asia and the Pacific region and, in particular, to advance the consultative process by discussing possible elements of a framework for meaningful and effective actions to enhance the implementation of Article 4.5 of the Convention. Consequently the workshop focused on:

(a) The exchange of information and ideas among participants on issues, opportunities, barriers, needs and concerns relating to the transfer of environmentally-sound technologies, particularly to the Asia and the Pacific region;

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[1] The country papers are available on the UNFCCC web site (from www.unfccc.de, select "Programmes", then "Technology", then select the country papers under the Asia and the Pacific regional workshop).

(b) Consideration of multilateral initiatives to enhance the transfer of environmentally-sound technologies in the Asia and the Pacific region;

(c) Ways and means for improving the transfer of environmentally-sound technologies and know-how under the Convention, considering perspectives from governments, non-governmental organizations and the private sector;

(d) Possible elements of a framework for meaningful and effective actions to enhance implementation of Article 4.5 of the Convention.

11. An important central theme emerged from the workshop. Discussions in the first regional workshop had focused on issues and concerns of "the what" (what are the technology needs, what are the barriers, what are the roles of different stakeholders, etc.?). Discussions in the second regional workshop began to address questions of "the how" (e.g., how can technology needs be identified and assessed, how can barriers be identified and addressed, how can different stakeholders participate, and how can these ideas be brought together in a framework for action under the UNFCCC?).

12. The workshop participants recognized that the Asia and the Pacific region comprises a large number of countries with a diverse range of environmental, geographic, economic and social characteristics. It contains a combination of some rapidly emerging economies with substantial private sectors (frequently comprising significant transnational and/or small and medium-sized enterprises (SMEs)) as well as some of the least developed countries in the world.

13. Despite this intra-regional diversity, the workshop was able to consider many of the complex aspects of the special situations and needs of individual countries. In this context, participants were able to consider the issues and questions contained in the annex to decision 4/CP.4 and provide suggestions for elements of a framework for meaningful and effective actions to enhance the implementation of Article 4.5 of the Convention.

14. The report summarizes the proceedings of the workshop in five main sections:

- Technology needs and technology needs assessments
- Technology information
- Overcoming barriers to the transfer of technology
- Building capacity for the development and transfer of technology
- Suggested possible elements of a framework

B. Technology needs and technology needs assessments

15. Specific examples and greater detail of technology needs and approaches to technology needs assessments are contained in the country papers. A number of themes emerged at the workshop relating to technology needs and technology needs assessments.

16. The participants from developing countries within the region noted that ESTs should simultaneously address basic human needs and be compatible with nationally determined socio-economic, cultural, environmental and sustainable development priorities. This issue is particularly important to the poorest and least developed countries in the region.

17. Participants noted that the identification and assessment of technology needs should be led by the developing country Parties themselves. They recognized, however, that in many cases this process requires the support and assistance of developed countries. Needs identification and assessment should be a transparent, bottom-up, multi-stakeholder, participatory process to facilitate the identification, assessment, prioritization, and communication of technology needs.

18. Some developing country participants noted that several countries in the region have already completed needs assessments and/or compiled a list of technology needs. These countries suggested that further action to refine these needs assessments was of less importance than moving forward to develop and implement action to respond to these identified needs. Thus an important element of a framework would be incentives for early and immediate action.

19. The adaptability of technology to local markets and situations was frequently mentioned and discussed in the context of processes to assess countries' technology needs. Participants recognized that technology transfer is not a one-step event, but a process of partnership and cooperation among various stakeholders. Participants noted that a sustainable approach to technology diffusion and adaptation to local conditions is a long-term, country-driven process. Such a process is inherently complex as it demands a country-, project- and technology-specific approach.

20. The importance of considering both mitigation and adaptation technologies was emphasized by many speakers. Participants suggested that technology priorities will necessarily reflect differing needs across the region in relation to mitigation and adaptation. Some participants recommended that, within the range of mitigation options and technologies, there would be advantages in focusing initially upon technologies that have potentially large commercial markets.

21. In the case of adaptation technologies, it was acknowledged that the needs in this area are being overlooked. The range of possible adaptations to climate change is large and spans many socio-economic, ecological and environmental categories. The market for technological approaches to adaptation is therefore also potentially large. However, various barriers are present which prevent markets for adaptation technologies from being realized. Governments could play a leading role in overcoming such barriers. In this context, participants suggested that the initial focus be on so-called "win-win" adaptation technologies which provide both climate change benefits and support socio-economic and sustainable development objectives.

22. An important element of a framework for meaningful and effective actions could be for Annex II Parties to assist non-Annex I Parties with the process of technology needs identification and assessment. There is also a need to more systematically communicate and report the results of these needs assessments to other Parties.

C. Technology information

23. The working groups reflected upon various aspects of the information on ESTs which is needed and how this information could best be identified, developed, stored, accessed and provided to Parties.

24. Several common themes emerged from the discussions. A central question was how to enhance the flow of information between developed and developing countries and among developing countries. It was agreed that information must be targeted to assist the various categories of stakeholders involved in making decisions which relate to technology transfer. It was also generally recognized that a first important step toward improving the flow of information is to enhance the capacities of existing regional organizations and centres. The need for and scope of additional functions of such centres should be examined and defined.

25. Participants noted that accessing appropriate, reliable and useful information on technology is often difficult and not always possible. Improving access within developing countries to better information on the best available technologies and processes for mitigation and adaptation technologies should be a priority.

26. The suitability of the Internet as the main vehicle for information exchange in the region was examined. Regional participants noted that many small and medium-sized enterprises in parts of the region do not have access to the Internet. In some cases, more conventional methods of information sharing may need to be employed, such as newsletters and other printed material.

27. Quality control and comparability of information were raised as key priorities that need to be addressed. To improve the quality and transparency of information, several participants suggested that performance evaluation ratings for technologies be developed to facilitate comparability of technologies on a uniform basis. Ratings could be used as a yardstick for governments and firms choosing technologies, either domestically, or through technology transfer from overseas.

28. Several ideas were put forward concerning both the supply-side and the demand-side aspects of information dissemination. To ensure the availability of important information needed for effective technology transfer, several participants suggested the development of inventories or databases in areas such as publicly-owned technologies and indigenous technologies, as well as an inventory of technology-related needs of developing countries for ESTs. Several participants believed that it would be extremely valuable to improve the availability of information on case studies and demonstration projects implemented.

29. It was noted that much more information on technology-related activities and projects exists than is reported in national communications and submissions. It was suggested that since this information is available, or could be made readily available at the national level, any framework should attempt to include and incorporate such information as it would be useful to Parties. Several participants suggested that a database of relevant projects be constructed and maintained to assist various stakeholders to learn from the range of global experience already gained. Such a database could be maintained by the UNFCCC and contain a register of technology transfer projects recognized under the Convention.

30. The establishment of a technology information clearing house was put forward by several participants. The clearing house functions could include some or all of the above-mentioned areas of information collection, analysis, storage and dissemination. Further ideas for the functions of such a clearing house included: hosting a list of global source(s) of information on ESTs, coordinating activities with a number of international, regional, national and thematic focal points via the Internet, and mobilizing the private sector and other intermediaries to contribute their knowledge and skills.

31. Several concerns about the neutrality and security of information dissemination under the Convention were raised and the benefits of utilizing existing international agencies of high repute were noted. In addition to providing an effective "filter" for information, an important function of a clearing house could be to ensure the security of information relating to patents and intellectual property rights.

32. Participants agreed that a successful framework for technology transfer should cater for such concerns of quality, access, reliability and comparability of information on ESTs. The participants considered how a framework under the UNFCCC could assist Parties in assessing the sufficiency, reliability and credibility of information sources. The extent to which any framework could itself assist in standardizing the assessment and verification of the quality of information was left as an open question.

D. Overcoming barriers to the transfer of technology

1. Barriers to technology development and transfer

33. Several important themes emerged at the workshop relating to technology transfer barriers and the action needed to overcome them. There was broad agreement that the removal of barriers to the transfer and development of ESTs is an important element of a framework to enhance technology transfer under the Convention.

34. The wealth of information on both country- and region-specific barriers to the transfer of technology contained in the country papers submitted to the workshop, in a previous technical paper on barriers (FCCC/TP/1998/1) and in the report of the African regional workshop on the technology transfer consultative process (FCCC/SBSTA/1999/11). Recognizing the need to move the consultative process forward, the participants focused on questions of "how" these barriers could be addressed within a framework under the UNFCCC rather than providing additional information on "what" the general barriers are.

35. While much of the discussion on this subject focused predominantly on ways and means of overcoming barriers, several additional barriers and categories of barriers not included in the above-mentioned sources were identified. In particular, the workshop participants noted that barriers and constraints to the transfer of ESTs exist in both developing and developed countries.

36. Important institutional barriers were identified, such as insufficient linkages between the technology research and development agencies and the development assistance agencies in many developed countries. In developing countries, insufficient local capacity to adequately support and manage imported technologies was noted as significant in this region.

37. Technological barriers identified in the Asia and the Pacific region included a lack of endogenous research and development capabilities and a lack of regional capacity to adapt imported technologies to local conditions. For some of the least developed countries, a lack of understanding of technology needs was expressed.

38. In terms of technology information, participants noted a general lack of access to technical information on available technologies. Information that is available is not readily comparable and often of variable or dubious quality. Information on publicly-owned technologies is scarce and inconsistent.

39. Political barriers pertaining to both developed and developing countries were noted. These barriers included insufficient integration of climate change goals into industrial regulation and economic development policy, and lack of awareness of climate change issues among various development organizations, trade associations and industries.

40. Economic barriers were discussed. These included the problem of immature or non-existent markets for promising emerging technologies and for technologies associated with adaptation to climate change as well as a general lack of understanding of the operations of EST markets. Business practices that restrict access to and transfer of technologies from developed countries were also noted, as were other issues such as export credits.

41. Many participants noted financial barriers, citing complex and bureaucratic processes to access funds, particularly in multilateral institutions, as well as a general lack of micro-credit facilities, intermediary businesses and availability of innovative financing for emerging EST markets.

42. Many specific ideas were suggested as possible ways of overcoming these barriers. The participants noted that an initial step entails the identification and analysis of barriers. Recognizing that key barriers may manifest themselves differently in different countries and sectors, the participants agreed that the identification, analysis and prioritization of barriers must be a country-driven process which involves input from the full complement of international stakeholders in the technology transfer process. However, it was also noted that many developing countries may not have adequate capacity to do so and would require external assistance from developed countries.

2. How technology cooperation and assistance can address barriers

43. The working groups and panel discussions noted that technology cooperation efforts need to be better targeted and coordinated. Efforts must address key concerns as viewed from the perspective of the developing countries rather than being targeted at technologies which may be more easily transferred, but are less appropriate in the local circumstances. The development of joint research and development activities was suggested as one way to deal with this problem.

44. Technology cooperation must also address technology transfer conditions which dictate the use of donor-country consultants, purchase of their equipment, use of their contractors, etc.

A more open, multilateral approach is needed that involves full consultation with the user country on project development, technology selection and implementation.

45. The concept of technology partnerships, public/public, public/private, and private/private, emerged as an important aspect of a framework to enhance the development, adaptation, adoption and integration of imported technologies. Many participants expressed hope that partnerships could be established in the areas of technology research and development, financing, project identification and design, project implementation and management, business matchmaking and joint ventures.

46. Discussions generated several ideas on how new and innovative technology, know-how and practices could more effectively be introduced and adopted in countries of the region through technology cooperation. Demonstration and pilot projects were suggested as a possible element of a framework that could enhance the transfer of technology. These projects could provide initial stimulus to the development of new markets, develop confidence in emerging technologies, ensure that local conditions are given full consideration, raise the awareness of key stakeholders, promote the utilization of local consultants and contractors to enhance endogenous capacities, and promote development of the "intermediary" businesses needed to sustain technology penetration.

47. Coordinated participation of a wide range of stakeholders in the process of addressing technology transfer barriers was also recognized as an important ingredient of a framework for action. The panel sessions spent considerable time discussing the role and function of the key stakeholder interests, which include governments, non-governmental organizations, intergovernmental organizations, and the private sector. There was general agreement that governments, in particular, must take the lead as they play a vital coordinating role in promoting stable, long-term enabling environments, assisting in new market creation, channelling bilateral assistance to leverage private sector funds and leading with official development assistance where markets fail.

3. How governments can help overcome barriers

48. A range of ideas were put forward on the role of the public sector in developing and implementing activities to overcome barriers to the transfer of technology. There was general agreement that one of government's most effective roles is to create the economic, legal and regulatory conditions that promote private sector trade and investment resulting in technology transfer, including the removal of market barriers and building human capacity; in other words, helping to create an enabling environment to facilitate enhanced flows of technology.

49. Providing the enabling environment was noted as a responsibility of both developed and developing country Parties. Participants agreed that the enabling environment does not only refer to the private sector and that effective enabling environments need to be presented on both sides of the technology transfer spectrum.

50. In subregions and/or sectors where market forces are not yet well developed, governments and the public sector would need to play a more comprehensive role to increase access to technologies and effectively facilitate the transfer of technology. Some suggested

activities included: reorientation of lending policies of financial institutions towards "greener credit", opening of "special windows" for financing ESTs, long-term soft loans for effective demonstration of both soft and hard technologies, and creation of separate research and development funds to support joint research and development initiatives for indigenous development of ESTs.

51. It was noted that all governments should facilitate the integration of climate change objectives into industrial, economic and development policy. In particular, developing countries can implement effective and successful "win-win" activities which simultaneously address local environmental concerns as well as climate change objectives.

52. Improving the enabling environment in developed countries could be facilitated by inward-looking activities such as capacity-building and effective engagement of the private sector. Important outward-looking activities include reorienting donor assistance to better integrate this assistance with host country development plans; removing conditionalities on donor assistance; coordinating assistance with other bilateral and multilateral donors; removing barriers to the dissemination and application of research and development; and developing programmes on the transfer of publicly-owned technologies.

4. How the private sector and non-governmental organizations can help

53. Participants recognized that the private sector is an important vehicle for the development and transfer of technologies. In developing countries, technology transfer via the private sector occurs, in part, through the participation of SMEs. While the large multinational industrial enterprises most often have in-house capability for participating in this process, effective technology cooperation involving SMEs will require that they be provided with appropriate tools to participate, including know-how and access to realistic performance data, and the capacity to access, scan, screen, and evaluate available technologies.

54. To further improve the participation of regional SMEs in the technology transfer process several participants suggested that assistance be provided to small-scale industrial units to assist them to control pollution through adoption of cleaner technologies. Encouraging these industries to respond simultaneously to local environmental objectives and global environmental concerns would broaden their understanding and increase their participation in the transfer of ESTs.

55. Participants from the developing countries felt that a key element of a technology transfer framework would be to ensure the development of the capabilities of host country intermediaries, such as energy service companies, banks and consultants.

56. Recognizing a potentially valuable role for non-governmental organizations, participants agreed that a framework for actions should, where appropriate, utilize the local and regional non-governmental organizations in an increasingly important capacity to inform and involve the SMEs in this process. The participants noted that to further promote the involvement of the private sector in EST transfer, non-governmental organizations could help to facilitate the integration of climate change objectives into industrial, economic and development policy.

5. How intergovernmental organizations can participate

57. Many developing countries felt that existing bilateral and multilateral mechanisms do not fully meet the needs for technology transfer in some cases and hence there is a need to promote additional supportive or cooperative approaches to take into account the concerns and considerations of developing countries. The question of whether new institutions would be needed or whether enhancement of the functions of existing institutions would be sufficient was left open.

58. It was suggested that the UNFCCC could play a larger role in collecting, synthesizing and disseminating information deemed important to Parties on technology transfer. Information could include: case studies, innovative approaches to technology cooperation, best practices, performance standards, publicly owned technologies, a database of technology experts, etc. Suggested mechanisms for information collection and dissemination could include workshops, technical papers and the Internet.

59. Multilateral efforts to facilitate technology transfer, including those of the World Bank, regional development banks, the Global Environment Facility, CTI, etc., could be more effective with greater emphasis on capacity-building and coordination with national objectives. These institutions could be entrusted to coordinate donor (bilateral and multilateral) responses to climate technology needs, help countries establish one set of technology cooperation priorities, and report on successes and failures of ongoing programmes.

E. Building capacity for the development and transfer of technology

60. The discussion on capacity-building for technology transfer tended to narrow the main areas of concern to four important aspects of capacity-building in relation to technology transfer activities under the Convention.

61. Firstly, participants recognized that the scope of potential capacity-building activities includes needs assessments, prioritization, planning, implementation, monitoring and evaluation.

62. Secondly, they noted that technology transfer does not solely concern so-called "hard technologies" but is almost always also about so-called "soft technologies" (e.g. know-how and practices). Indeed, sometimes it is *exclusively* about soft technologies. It was noted that transferring experience, knowledge, skills, know-how and practices in itself builds capacity. The assessment of existing capacities and the identification of gaps where capacity-building activities can be targeted is therefore another important step which must be incorporated into the design of any framework. More effort is needed to raise awareness of the many ways in which donor countries could support and channel resources to effectively build capacities.

63. Thirdly, participants agreed that the capacity-building activities which can most successfully help achieve and sustain effective technology transfer are those which measurably utilize and enhance existing endogenous capacities and technologies.

64. Fourthly, they noted that, in practical terms, often the best way to build capacity is through demonstration or pilot projects. Many reasons were cited for this, including: the simple

benefits of learning by doing; the vertical coordination of a large number of decision makers and stakeholders which project experience brings about; creation and support for necessary "intermediaries"; the use of local consultants and contractors to enhance capacities; and the positive effect that projects have on the broader enabling environment.

65. Discussions did raise issues relating to donor-led versus country-driven efforts to build capacities. It was pointed out that capacity-building through international bilateral or multilateral activities is usually a two-way process resulting in the building of capacities on both sides, i.e. the host country as well as the donor countries or organizations themselves. Participants from developing countries raised the question of how any framework could assist in building the capacities of the donor countries to make their contributions more effective. Participants also noted that issues relating to capacity-building are being considered elsewhere in the climate negotiations process and that it may be necessary towards COP 6 to distinguish carefully, if possible, those elements of capacity-building that relate most directly to enhancing the implementation of Article 4.5 of the Convention.

66. It was mentioned that, in addition to capacity-building for developing countries, there was also a need for capacity-building in developed countries on issues of technology transfer and the UNFCCC. It was suggested that a separate workshop be held mainly for developed country Parties, with developing country participation, for exchanging information and sharing experience on the implementation of Article 4.5.

F. Suggested possible elements of a framework

67. In the working groups and the final panel session of the workshop, the Chairman requested participants to share and discuss their initial ideas on possible elements of a framework for meaningful and effective actions to enhance the implementation of Article 4.5 of the Convention. As these preliminary ideas emerged, the Chairman did not attempt to hold a debate or to reach agreement among participants on the appropriateness, practicability or acceptability of these ideas or on how such ideas relate to a framework.

68. The various ideas and suggestions by participants are grouped together under the following headings: issues and concerns regarding a framework; suggestions for possible action by Annex II Parties; suggestions for possible joint activities and partnerships; and suggestions for possible intergovernmental activities.

1. Issues and concerns regarding a framework

69. Several key issues emerged related to the elements of a framework for action under the UNFCCC. One key question relates to scope, namely, which actions should be recognized as fulfilling the commitments of a Party under the Convention. Another key question relates to accountability, namely, how can technology transfer be measured and reported upon under the UNFCCC. A further issue focused on the framework itself and includes questions such as "what is a framework?", "what are elements of a framework?", and "how to develop such a framework under the UNFCCC?".

70. Several developing country participants suggested that a framework for action should directly address the commitments of developed country Parties contained in Article 4.5 of the Convention. These participants believe that the onus falls upon the governments of developed

countries to take action to fulfil their responsibilities under Article 4.5 and report upon activities undertaken and the outcome of these activities. These participants believe that action taken by the private sector lies outside the Convention commitments and hence differs from action by governments to meet obligations under Article 4.5.

71. Further, several participants linked the scope of a framework to Article 11.1 of the Convention, which addresses the provision of financial resources for technology transfer on a grant or concessional basis. These participants noted that technology transfer on "non-commercial terms" requires an active government role in transferring technologies rather than reliance on the private sector.

72. Other participants noted that a framework should take a broader view of technology transfer, in light of the many changes and developments which have occurred since the Convention was drafted. An effective and sustainable framework to enhance technology transfer under the Convention should recognize and take into account these more recent developments, including effective bilateral and multilateral technology transfer programmes. These participants noted that transfer of technology is occurring and that it occurs most effectively when there is a partnership between stakeholders in developed and developing countries. These participants envision a framework that would explicitly recognize private sector action and government activities to enhance private sector action as meeting the commitments of the Parties under the Convention.

73. On the issue of expanding the scope of existing activities and institutions, several participants suggested that the existing bilateral and multilateral programmes were effective and sufficient and cautioned against establishing additional mechanisms or new institutions without further study. Other participants felt that existing mechanisms do not target EST transfer adequately or specifically enough and should be strengthened, and that new mechanisms may also be necessary.

74. Many participants expressed the idea that a framework should improve reporting and measuring procedures for technology transfer for all Parties under the Convention. How best to measure technology transfer under the Convention and by which metric (e.g., using financial indicators, technology indicators or market impact indicators) to evaluate these efforts were recognized as difficult issues which will require further discussion. Further, several participants expressed concern as to whether or not meaningful technology transfer goals could even be set.

2. Suggestions for possible actions by Annex II Parties

75. Develop or enhance "one-stop technology transfer shops" within donor countries to facilitate developing countries' access to technologies and mechanisms for their transfer.

76. Develop or enhance inventories and/or databases of technologies and technology transfer activities of Annex II countries. These data could include information on publicly owned technologies and on case studies and demonstration projects.

77. Develop or enhance a specific bilateral mechanism by which Annex II Parties can provide financial and technical assistance to non-Annex I Parties to carry out effective technology needs assessments and identify priority technology needs.

78. Develop or enhance programmes to respond to identified priority technology needs of developing countries, including the implementation of technology demonstrations and pilot projects.

79. Develop or enhance a specific mechanism to fund technology transfer projects and activities on a grant or concessional basis. This mechanism could include a provision to improve access of developing countries to the rights to specific technologies which have been identified as a priority.

80. Develop or enhance national quality assurance programmes for technology transfer exports and related development assistance programmes, projects and activities.

81. Develop or enhance specific domestic policies and measures to promote the transfer of ESTs by the private sector to developing countries.

3. Suggestions for possible joint activities and partnerships

82. Create, with the assistance of Annex II Parties, specific, national "climate change technology units" in developing countries. These national bodies could be vested with responsibility to develop national inventories of technology-related needs, plan and implement the diffusion of priority technologies, and serve as focal points for stakeholder involvement in technology transfer activities.

83. Enhance coordination of national energy and environmental research and development programmes with international development assistance activities both within and between Annex II and non-Annex I countries. This could include development of joint donor-developing country research and development initiatives on key technologies or technologies of mutual interest.

84. Develop, with the assistance of Annex II countries, greater awareness and better understanding among decision makers in developing countries of issues related to patents, intellectual property rights and equipment standards and certification.

85. Develop a multilateral technology programme to assist developing countries to establish a domestic programme to conduct technology needs assessments, identify technology priorities, and build appropriate institutional and human capacity needed for sustainable technology transfer. The programme could coordinate collaboration of stakeholders from both donor and developing countries in the technology transfer process.

86. Develop a programme to cultivate bilateral and/or multilateral technology partnerships in the areas of project financing, identification and design, project implementation and management, and joint ventures.

4. Suggestions for possible intergovernmental activities

87. Establish a separate process under the Convention, apart from national communications, for Annex I Parties to report on technology transfer activities. While revised guidelines for

Annex I national communications were also suggested, several participants noted that the relevant timescales and level of detail may still be insufficient to satisfy all Parties.

88. Establish a separate process under the Convention, apart from initial national communications, for non-Annex I Parties to communicate results of national technology needs assessments, including elaboration of technology priority needs, key barriers, priority programmes and projects.

89. Develop an intergovernmental technology advisory panel under the Convention to monitor and evaluate technology transfer activities.

90. Establish an ad hoc panel of experts under the Convention to monitor and review activities on technology transfer at the country level and participate actively in helping to develop and improve the international technology transfer process.

91. Develop a multilateral mechanism under the Convention for coordinating donor assistance in specific technological areas and regions.

92. Develop performance evaluation ratings for technologies to facilitate comparability of environmentally-sound technologies on a consistent basis.

93. Enhance networks to disseminate technology information.

94. Establish a technology information clearing house to facilitate technology information collection, analysis, and dissemination.

95. Develop international technology demonstration centres to demonstrate and commercialize viable ESTs in developing countries.

96. Arrange for other possible future activities to be undertaken by the UNFCCC secretariat, which would include:

(a) Collecting, synthesizing and disseminating information on case studies, best practices, innovative technology transfer approaches, and practical technology transfer experiences;

(b) Compiling technology performance standards;

(c) Identifying and developing inventories of publicly owned technologies;

(d) Synthesizing and assessing information on emerging technologies;

(e) Maintaining a register (database) of technology transfer projects.

Annex

REPORT OF THE SECOND CLIMATE TECHNOLOGY INITIATIVE/INDUSTRY JOINT SEMINAR ON TECHNOLOGY DIFFUSION IN ASIA

A. Introduction

1. Approximately 110 participants from 30 countries representing the private sector, government, and non-governmental organizations participated in the second CTI/Industry Joint Seminar on Technology Diffusion in Asia, 13-15 January 2000. The seminar provided a forum for discussion on a wide range of topics, from what was meant by technology transfer, to practical, near-term steps that might be taken to promote, facilitate, and finance transfer of and access to environmentally-sound technologies and practices.

2. The outcomes from the CTI seminar were reported at the UNFCCC regional workshop on the transfer of technology consultative process held in Cebu, the Philippines, 17-19 January 2000. This report summarizes the outcomes of the CTI seminar as follows: (1) perspectives on technology transfer; (2) capacity-building needs; (3) information needs; (4) institutional needs; and (5) financing and project development.

B. Perspectives on technology transfer

3. Participants were in general agreement that technology transfer was not a single-step process, but consisted of several steps, including: (1) creating awareness of the need for environmentally-sound technologies (ESTs); (2) obtaining information on and assessing technology options; (3) developing capacity for absorption/adoption; and (4) implementing and operating the technology.

4. Participants noted that the challenge within the transfer of technology consultative process was to find politically acceptable and practicable answers to the issues and questions in the annex to decision 4/CP.4.

5. The seminar considered a broad view of the scope of activities involved in technology transfer. This view included activities that result in the acquisition, introduction, and integration of hard and soft technologies into a country. Participants felt that meaningful technology transfer goes beyond the installation of turnkey projects and should include the transfer of knowledge and skills necessary to maintain and support technologies.

6. Several participants noted that for technology transfer to be successful, countries should have in place well-defined and enforceable intellectual property rights protection so that the owners of ESTs will be confident that the terms of licensing or other agreements will be respected.

C. Capacity-building needs

7. Several participants took note of the lack of entrepreneurial and technical skills necessary to absorb more advanced technologies. It was suggested that some of this human-endowed

capacity-building could be developed through bilateral and multilateral activities which might include technical exchanges, demonstration projects, and education, such as the technology training courses being conducted on a regional basis by the CTI. Growth of technical and entrepreneurial capacities within some developing countries could provide increased opportunities for south-south cooperation.

D. Information needs

8. Although participants acknowledged some improvements in the quality and accessibility of information on ESTs, they also reiterated that there is a serious need for greater awareness and understanding of technology options to respond to climate change, including those related to adaptation. The lack of information on technology alternatives, and/or the lack of access to information channels can inhibit the adoption of ESTs and practices. In some situations, the problem is not the absence of information per se, but access to relevant, useful information.

9. Participants noted that as availability of and access to climate-related information increases, it becomes even more important to maintain the quality of such data. This is where the establishment of well-defined country-specific needs can be of great assistance when assessing technology alternatives. Participants discussed how such a need might be met through the CTI programme of working with countries to develop a cooperative technology implementation plan laying out specific technology needs and options for particular sectors.

10. Participants also noted the present difficulty in making meaningful inter-country or regional comparisons to assess the extent of technology transfer progress under the Convention. It was suggested that a technology assessment matrix be developed wherein technologies would be ranked according to their relative environmental, social and economic benefits.

E. Institutional needs

11. Two themes relating to institutional needs were highlighted. First, participants noted that successful technology transfer most often occurs through collaborative involvement of government, the local community, and the private sector. Second, participants emphasized that without the involvement of the private sector only limited technology transfer will occur, as governments can only do so much directly.

12. Several participants noted that governments can play an important role through enacting policy reforms with the intent of creating markets, increasing private sector participation and increasing investments in large-scale project implementation. At the same time, some participants cautioned that too much government intervention can actually slow down the process of adopting climate-friendly technologies. Many participants felt that governments should be more a facilitator than a regulator, since regulation can inhibit innovation, and that regulations which provide greater benefits for the costs they impose are likely to be both more attractive and more effective in the long term.

13. It was noted that public policy interventions, such as incentives and government procurement practices, may be appropriate in some cases to accelerate adoption of environmentally sound technologies and promote the demand for a particular technology need.

Participants voiced the need for public support of technology development costs, since, due to risks and the "free-rider" problem, it is often not in the best interest of a single firm to cover the entire investment.

F. Financing and project development

14. Participants discussed financing of projects in terms of both lending and borrowing perspectives. Both perspectives acknowledged that financing is a risk-sharing business between project developers and lenders. It was broadly agreed that financing is more effective when borrowers and lenders clearly identify and understand the potential environmental issues, socio-economic impacts, management capabilities, and other salient aspects associated directly and indirectly with the specific project initiative.

15. Participants noted that the transaction costs of financing are not directly related to the size of loans. The costs of placing a small loan may be nearly as great as those to process a loan for a major project and therefore small projects may need financial intermediaries. Several participants suggested that bilateral activities and multilateral organizations should focus on small and medium-sized enterprises.

16. Several participants identified a need to increase the number of "green" bankers. Some participants noted that lenders could be more sensitive to borrowers' environmental needs and the local socio-economic impacts of projects. Several participants suggested that one option is to change the mind-set of the financial community so that environmental issues are viewed as opportunities rather than cost issues. In that regard, many participants characterized the clean development mechanism (CDM) as such an opportunity. In the context of CDM as well as other project investments, recognition was given to in-country benefits in the form of significant increases in revenue to the government and the local economy for infrastructure improvement.

G. Suggested roles for CTI in the Asia-Pacific region

17. Participants discussed how multilateral activities such as the CTI can continue to help promote meaningful and effective technology transfer under the UNFCCC. The seminar participants identified five activities which initiatives such as the CTI could undertake:

(a) Develop technology training courses to build indigenous capacity. Training courses should be focused and directed toward specific regional needs. It was also suggested that training materials, particularly for the use of course graduates to train others, could be developed and widely disseminated;

(b) Organize technology diffusion seminars structured to address country and regional priorities and contemporary issues. Several participants noted the need to organize a seminar in the small island states to cover adaptation issues. In addition, participants also identified a need hold seminars in developed countries on technology transfer, particularly to engage the private sector in the UNFCCC process;

(c) Improve access and linkages to better quality information on climate-friendly technology (e.g., via technology-specific search engines such as that available at http://www.ClimateTech.net, and other reports on EST market information and best practices);

(d) Maximize the use of existing programmes to provide incentives for ESTs;

(e) Expand multilateral activities with countries in the Asia and the Pacific region to collaboratively establish priority technology needs on a sectoral basis (e.g., through cooperative technology implementation plans).

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METHODOLOGICAL ISSUES

GUIDELINES UNDER ARTICLES 5, 7 AND 8 OF THE KYOTO PROTOCOL

Experience of Annex I Parties with existing national systems for preparing greenhouse gas inventories

Note by the secretariat

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I. INTRODUCTION

A. Mandate

1. Article 5.1 of the Kyoto Protocol states that each Annex I Party shall have in place, no later than one year prior to the start of the first commitment period, a national system for the estimation of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol.

2. At its tenth session, the Subsidiary Body for Scientific and Technological Advice (SBSTA) requested the secretariat to organize a workshop on national systems and issues relating to adjustments, referred to in Article 5 of the Kyoto Protocol, before its twelfth session (FCCC/SBSTA/1999/6, para. 34 (d)). At its eleventh session, the SBSTA requested the secretariat to prepare documentation for consideration at the above-mentioned workshop (FCCC/SBSTA/1999/14, para. 51 (c)) on the experience of Annex I Parties with existing national systems for preparing greenhouse gas inventories.

B. Scope

3. This note responds to the request by SBSTA for information on existing national systems for preparing greenhouse gas inventories. This information is intended to assist Parties in considering how to design guidelines for national systems under Article 5.1 of the Kyoto Protocol.[1] The note summarizes information on the current practices in some Annex I Parties and identifies issues relevant to the existing national systems for the preparation of greenhouse gas inventories, including timing and frequency of submission of these inventories.

4. The main findings of this paper were presented during the workshop mentioned in paragraph 2 above, which was held in Bonn from 14 to 16 March 2000.

C. Approach

5. The information presented in this paper was obtained during a number of country visits (Australia, Canada, Greece, Ireland, Italy, Japan, the Netherlands, the Russian Federation, Ukraine, the United Kingdom of Great Britain and Northern Ireland and the United States of America)[2] and from in-depth review reports for these Parties. Additional information, used for the purpose of this paper, was made available during a workshop held in cooperation with the United Nations Institute for Training and Research (UNITAR), in Geneva from 30 November to 2 December 1999, on the new UNFCCC guidelines on annual inventories and options to address challenges facing Annex I Parties with economies in transition in preparing greenhouse gas

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[1] A draft of the guidelines under Article 5.1 of the Kyoto Protocol is contained in document FCCC/SBSTA/2000/INF.5/Add.1.

[2] For Greece, the Russian Federation and Ukraine, the visits were scheduled at the same time as the in-depth review of the national communication.

inventories (FCCC/SBSTA/2000/INF.1). Other source documents include a report on national greenhouse gas emissions inventory submissions from Annex I Parties for 1990 to 1996 (FCCC/SBI/1999/5), a report on national greenhouse gas inventory data from Annex I Parties for 1990 to 1997 (FCCC/SBI/1999/12) and a report on methodological issues identified while processing greenhouse gas inventory data submitted by Annex I Parties (FCCC/SBSTA/1998/7).

6. In the context of this paper, the term *existing national systems* is used to describe the general framework that already exists in Annex I Parties for estimating greenhouse gas emissions and removals and reporting and archiving greenhouse gas inventory information. It does not refer to future national systems to be developed under Article 5.1 of the Kyoto Protocol.

7. This paper constitutes a compilation of identified issues in the context of existing practices in some Annex I Parties and makes no attempt to address particular inventory problems, as in document FCCC/SBSTA/1998/7, or to assess the effectiveness of the implementation of various practices. The paper does not provide a comprehensive list of all the issues and problems identified during the country visits, but focuses rather on those aspects of the existing national systems that were considered as most pertinent for the drafting of guidelines for national systems under Article 5.1.

D. Possible action by the SBSTA

8. The SBSTA may wish to take the information in this paper into account when considering the guidelines on national systems under Article 5.1 of the Kyoto Protocol.

II. EXISTING NATIONAL SYSTEMS

9. In accordance with Articles 4 and 12 of the Convention, Annex I Parties are required to communicate to the Conference of the Parties (COP), through the secretariat, a national inventory of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol. The guidelines for reporting greenhouse gas data were originally adopted by the COP at its second session (decision 9/CP.2) and were recently revised, at its fifth session (decision 3/CP.5).

10. The majority of Annex I Parties have developed national systems for estimating and reporting greenhouse gas inventory information. These systems are both formal and informal, encompassing the institutional, legal and procedural arrangements between the various competent bodies that are responsible for specific functions related to the planning, preparation and management of the greenhouse gas inventory.

11. Information on these systems related to activity data, methods and emission factors, quality of inventory data, timing and frequency of submissions and archiving of information, is presented in the following sections.

A. Institutional and procedural arrangements

1. Background

12. The responsibility for submitting greenhouse gas inventories to the secretariat lies with the national focal points. These may be governmental institutions (ministries, departments, offices, agencies) responsible for domestic and/or international environmental matters. In many cases, however, the national focal points are not directly involved in the preparation of the greenhouse gas inventories. This task is usually assigned to specialized national organizations through some form of legislative action, and/or to consultants under a limited time contract. Examples of the arrangements that exist in some Annex I Parties are provided in box 1.

13. In some Annex I Parties, there also exist inter-agency, inter-ministerial or expert advisory committees, acting as intermediaries between the national focal point and the inventory experts. These committees provide technical assistance and/or approve the national greenhouse gas inventory, before it is submitted to the secretariat. In other cases, the inventory is subject to an internal review process involving field experts, academics, the business community, non-governmental organizations and the general public.

14. It is not uncommon for organizations responsible for the preparation of the greenhouse gas inventory to establish cooperative agreements and/or subcontracts with other national institutions and consultants, if in-house expertise is limited or if greenhouse gas estimates for particular inventory sectors are being compiled separately. There is no common framework that describes the way that ministries cooperate with other national institutions, which is usually through internal organizational agreements, personal contacts and customary practices.

15. The level of involvement of local governments and various industrial groups varies among Annex I Parties. Traditionally, such an involvement has been sought during the design of environmental legislation and action plans, usually in connection with environmental problems other than climate change. In some cases, local authorities or companies have the responsibility to implement such legislation, including the maintenance of local or regional emissions registries for monitoring purposes. A number of Annex I Parties have initiated national programmes that involve the development and enhancement of such emissions registries that could be used for climate change purposes.

16. Some Annex I Parties include locally and regionally estimated greenhouse gas data for some sectors or activities in their national emissions totals. Other Annex I Parties include in their national submissions greenhouse gas data for their territories and provinces, which are estimated centrally by the organization responsible for the preparation of the national inventory and are approved by the local governments. Annex I Parties that are involved in the CORINAIR[3] programme, also estimate local and regional emissions on a regular basis. These emissions are not reported, since there is no requirement to do so under the Convention.

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[3] CORINAIR is the component dealing with air emission inventories of the European Community CORINE (Coordinated Information System on the State of Natural Resources and the Environment). CORINAIR is also used for reporting to the Convention on Long-range Transboundary Air Pollution under the auspices of the United Nations Economic Commission for Europe.

Box 1. Examples of institutional arrangements in some Annex I Parties

Australia
National focal point: Australian Greenhouse Office
Inventory preparation: Consultants
Arrangement: Contracts

Canada
National focal point: Environment Canada
Inventory preparation: Environment Canada
Arrangement: Government Organization Act

Greece
National focal point: Ministry of the Environment, Physical Planning and Public Works
Inventory preparation: National Observatory of Athens
Arrangement: Contract

Ireland
National focal point: Department of Environment and Local Government
Inventory preparation: Environmental Protection Agency
Arrangement: Environmental Protection Act

Italy
National focal point: Ministry of the Environment
Inventory preparation: National Agency for the Protection of the Environment (ANPA)
Arrangement: National Environmental Information System (managed by ANPA)

Japan
National focal point: Environment Agency
Inventory preparation: Sanwa Research Institute and Consulting Corporation
Arrangement: Contract

the Netherlands
National focal point: Ministry of Housing, Spatial Planning and the Environment
Inventory preparation: National Institute of Public Health and the Environment (RIVM)
Arrangement: Environmental Management Act

Russian Federation
National focal point: Federal Service for Hydrometeorology and Environmental Monitoring (Roshydromet)
Inventory preparation: Institute of Global Climate and Ecology (attached to Roshydromet)
Arrangement: Federal Programme for the Prevention of Dangerous Impacts of Climate Change and its Negative Consequences

Ukraine
National focal point: Ministry of Environmental Protection and Nuclear Safety
Inventory preparation: Agency for Rational Energy Use and Ecology
Arrangement: Contract

United Kingdom
National focal point: Department of the Environment, Transport and the Regions
Inventory preparation: AEA Technology (National Environment Technology Centre)
Arrangement: Contract

United States of America
National focal point: State Department
Inventory preparation: Environmental Protection Agency (EPA)
Arrangement: Memorandum of Understanding

17. The time taken to complete a national greenhouse gas inventory varies considerably among Annex I Parties. For some Parties, it is a year-round process, which starts once the previous inventory has been completed, while for other Parties, especially some Annex I Parties with economies in transition, it lasts for a few months depending on the resources available for this purpose.

2. Relevant issues

18. In some Annex I Parties, there is limited or no cooperation between the organization responsible for the preparation of the inventory and other national institutions, e.g. statistical offices, mostly because of lack of a national legislative framework, or other institutional arrangements, describing or delegating the responsibility for various aspects of the inventory development process to the appropriate national entities. In some cases, this results in either complete lack of underlying information for particular sectors or activities of the inventory or use of partial information from alternative sources that may maintain relevant data sets for different purposes.

19. The difficulties that some Annex I Parties with economies in transition have reported are primarily associated with the lack of financial resources for the inventory development process. In many of these Parties, there is usually no permanent staff; rather experts are hired on limited time contracts. This approach has an adverse effect on the continuity and consistency of the information submitted, especially if the inventory experts change from year to year, and if modifications or clarifications are required in the time period between the submission of inventories. Other problems that these Parties face include communication difficulties resulting in limited or no flow of new information to inventory experts and limited or no participation of these experts in training and other workshops to enhance their working skills.

20. As mentioned in paragraph 13 above, Annex I Parties follow different approaches for the approval of their greenhouse gas inventories, prior to their submission, varying from no formal approval procedure to a full-scale review process involving all stakeholders. In most Annex I Parties the final greenhouse gas inventory, including activity data, emission factors, use of new and/or revised information and any recalculations of estimates that were submitted in previous inventories, is only approved by the inventory experts responsible for the preparation of greenhouse gas estimates. The submissions by Annex I Parties, annual greenhouse gas inventories and national communications, do not generally include information on the approval process used by each Party.

B. Activity data

1. Background

21. The compilation of activity data and other statistical information necessary for the preparation of greenhouse gas inventories is generally the mandate and responsibility of national statistical offices, ministries and State or local agencies. Other organizations, for example, research institutes, non-governmental organizations and the business community, also maintain

relevant data sets either as part of their research activities or for monitoring purposes. In most Annex I Parties, the aforementioned entities are not directly involved in the preparation of greenhouse gas inventories.

22. There is no common approach among Annex I Parties to collecting statistical information. To achieve different purposes, Parties use questionnaires, sampling surveys and regular national censuses, that vary in scope, coverage and periodicity. No Annex I Party has a single publication that covers all activity data necessary for the preparation of a greenhouse gas inventory. Instead, activity data are published in a number of reports, at different times and by various institutions.

2. Relevant issues

23. In most Annex I Parties, the cooperation between statistical offices and inventory institutions does not extend beyond the communication of statistical data from the former to the latter. Inventory experts are not usually aware of the methods used by the various organizations for the collection and processing of the statistical information that is used for the preparation of the greenhouse gas inventories. Only a limited number of Parties employ statisticians or personnel with some knowledge of the statistical system of the country, in the inventory development process.

24. Publication of statistical information, which usually occurs at regular intervals, does not take into account the timing needs of the inventory preparation process. Delays in the publication of statistical data constitute one of the major reasons for gaps in greenhouse gas inventory information for particular years or sectors and for delays in the preparation and submission of inventories to the secretariat.

25. In some Annex I Parties, information for particular sectors is collected and published by more than one organizations. Inventory experts have the responsibility for selecting the most appropriate data sets for the preparation of the inventory based on the confidence in the source, the continuity and consistency of the information provided, and the quality of the data. The inventories submitted to the secretariat do not contain any information on any implications that the use of these data sets might have on the reported greenhouse gas estimates. In other Annex I Parties, however, the statistical information for particular sectors is either not available at all or is not published in an appropriate form for the preparation of the inventory. In such cases, the inventory experts resort to the use of very simple approaches (e.g. tier I methods) and/or make certain ad hoc assumptions for extracting the necessary statistical information from what is already available.

26. In some countries, publication restrictions, mostly because of confidentiality issues for certain industrial activities, affect the amount of data made available to the general public, including inventory experts. Gaps in the official national statistics are often filled through direct contact between the inventory organizations and certain industries or industrial groups. However, the cooperation of the various stakeholders is not always guaranteed or forthcoming and usually disclosing such information follows the provision of assurances for the maintenance of the confidential nature of the data.

27. The structural reorganization that has taken place in Annex I Parties with economies in transition since 1990 has posed hurdles for these Parties in providing complete greenhouse gas inventory data. The most common problems identified by Annex I Parties with economies in transition were outlined in document FCCC/SBSTA/2000/INF.1. The major challenges these Parties face are:

(a) Harmonization of the national statistical systems with international standards;

(b) Incompatibility of statistical classifications and inventory data format;

(c) Limited experience with managing and processing statistical information;

(d) Lack of archived data due to internal changes and shifts of responsibility to and from different institutions; and

(e) Limited information regarding the use, imports and exports of hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6).

28. The problem related to the availability of information on HFCs, PFCs and SF_6 is not only relevant to Annex I Parties with economies in transition, as indicated in document FCCC/SBI/1999/12.

C. Methods and emission factors

1. Background

29. All Annex I Parties use the flexibility provided by the IPCC Guidelines[4] concerning methods and emission factors. They use a mixture of default and more advanced methods, either from the IPCC Guidelines or from national or other compatible methodologies, such as CORINAIR.

30. In addition to default emission factors, Annex I Parties also use national emission factors in order to reflect their national circumstances for certain activities. In most cases, such emission factors are the result of direct measurements of certain gases from various industrial activities, usually monitored for other reasons such as air pollution. Other sources of national emission factors are the results of research of particular interest in some Parties, although most of such research has not been exclusively commissioned for climate change purposes.

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[4] Revised 1996 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories.

2. Relevant issues

31. Decisions relating to both methods and emission factors are usually taken by inventory experts and depend on the availability of underlying information for certain activities. In some Annex I Parties, the inventory experts consult other organizations and national experts before a final decision is taken, while in other cases, the decision is left entirely up to experts.

32. In some Annex I Parties, there is limited or no availability of national emission factors for some inventory categories and/or gases. These Parties, and particularly those with economies in transition, usually use default emission factors that may not reflect their national circumstances and could possibly result in under- or overestimation of emissions from particular sectors of the national greenhouse gas inventory.

D. Quality of inventory data

1. Background

33. The quality of the greenhouse gas inventory information depends on the quality of the underlying activity data and emission factors used. In all Annex I Parties, the organizations involved in collecting statistical data and/or developing emission factors are primarily responsible for ensuring the quality, regularity and completeness of the data through the application of quality assurance and quality control (QA/QC) procedures. These include, among others, trend checks, cross-referencing with related data collected elsewhere and expert judgement. However, the uncertainty associated with such information is usually either not available in a form that can be used by inventory experts or does not exist at all.

34. There is no common approach among Annex I Parties for ensuring and reporting the quality of inventory data, which depends on the application of appropriate quality control and quality assurance procedures. In most Parties, the implementation of quality control activities relies heavily on the expertise and experience of the personnel involved in the preparation of the greenhouse gas inventory.

2. Relevant issues

35. Although ensuring the quality of statistical information is an ongoing process in a number of Annex I Parties, statistical publications do not usually contain information about the quality of the statistical data. For example, sampling errors, non-sampling errors and quantified uncertainty estimates related to particular surveys are not published as part of the national statistics.

36. There is limited or no consistency in the provision of qualitative information, especially in the use of the IPCC overview table, and quantitative information that is usually based on expert judgement. Some Parties provide uncertainty estimates for some greenhouse gases either as ranges or single values, while one Party used a rounding protocol for its complete inventory data.

E. Timing and frequency of inventory submissions

1. Background

37. At its second session and subsequently at its fourth session (decisions 9/CP.2 and 11/CP.4), the COP requested Annex I Parties to submit to the secretariat national inventories of greenhouse gases on an annual basis by 15 April for the period up to the last but one each year prior to the year of submission.

2. Relevant issues

38. Twenty-six of the 39 Annex I Parties,[5] submitted their greenhouse gas inventories by the end of 1999 and two more Parties submitted greenhouse gas inventory data as part of their national communication. Five inventory submissions reached the secretariat by 15 April 1999. Another nine submissions were received with a delay varying between four and 25 days from the official submission deadline, while the remaining 12 submissions were received with a delay of two to eight months. A similar situation was also recorded in 1998 (FCCC/CP/1998/INF.9).

39. Some Annex I Parties submit information in draft or preliminary form, or in parts, or submit subsequent revisions to their inventories. Not all reporting Parties provide their greenhouse gas inventory data on an annual basis and for all the years in the period specified by decisions 9/CP.2 and 11/CP.4. In 1999, fifteen Parties provided data for the period 1990-1997 and eight Parties only for the year 1997. The other Parties provided information for some of the years in the period 1990-1997. Other issues related to completeness, consistency and comparability of the submitted inventory data were addressed in document FCCC/SBI/1999/5.

40. The timely preparation and submission of greenhouse gas inventories depends on a number of factors. Some of the most common causes of delay in this process relate to:

(a) Availability of resources;

(b) Difficulties in the cooperation between the entities responsible for the preparation of the inventory and other institutions responsible for other functions, e.g. statistical offices; and

(c) Timely availability of statistical data.

41. The issues identified in paragraph 40 above were also highlighted and discussed under other aspects of the existing national systems.

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[5] Belarus and Turkey have not as yet deposited an instrument of ratification, acceptance, approval or accession to the Convention.

F. Archiving of information

1. Background

42. The responsibility for archiving the inventory information lies primarily with the organization responsible for the inventory preparation, while in some countries this information is also stored and maintained by the national focal point. The majority of Annex I Parties use an elaborate set of spreadsheets for storing all relevant information (activity data and emission factors) and for estimating greenhouse gas data. Only a few Annex I Parties maintain a dedicated database for this purpose, e.g. countries that use the CORINAIR software.

2. Relevant issues

43. There is limited consistency among Annex I Parties in archiving disaggregated activity data and emission factors that would enable the reconstruction of inventory data. Although the majority of these Parties maintain all data sets used for previous inventory submissions, in some Parties older inventory data sets either are "overwritten" for new submissions or are not available because of the shift of responsibility for inventory preparation between different institutions.

III. CONCLUSIONS

44. National circumstances, as well as past and present practices, are of particular importance in the development of domestic national systems for the preparation of greenhouse gas inventories. Although some common problems for Annex I Parties were identified, the severity of these problems and their consequences for the inventory development process vary from country to country.

45. There is a distinct difference in the structure of the existing national systems between Annex II Parties and Annex I Parties with economies in transition. In general, the former tend to have a better developed national system than many of the latter Parties, which may rely on external financial support and expertise and/or sporadic preparation of greenhouse gas inventories due to the low level of priority associated with this process.

46. Some of the issues identified in the previous sections and possible courses of action in the development of national systems under Article 5.1 are presented in box 2. These issues might be taken into consideration in the further development of the guidelines for national systems.

Box 2. Issues identified and possible courses of action

Issues identified	Possible course of action
Limited or no formal procedures related to the inventory development process	✦ Elaboration and publication of an appropriate national plan, including planning, preparation, reporting, management and the delegation of responsibility for various aspects of the inventory development process ✦ Provision of adequate financial support
Limited or no cooperation between different institutions and problems in the communication of information	✦ Establishment of the appropriate institutional and legal arrangements for defining the responsibility and ensuring the flow of information among different entities involved in the inventory development process. ✦ Development of the necessary infrastructure for exchange of information with the assistance of electronic means of communication.
Limited or no formal procedures for the approval of national inventories and other inventory data	✦ Implementation of the necessary procedures to ensure the official consideration and approval of the inventory data, including use of new and revised emission factors and recalculated estimates
Limited or no information on the quality of statistical data and national emission factors	✦ Publication of the relevant information necessary for the estimation of uncertainties associated with the statistical data and national emission factors used for the inventory information. ✦ Establishment of the necessary institutional procedures between inventory and statistical organizations for ensuring the training and enhancing the awareness of personnel on cross-cutting issues related to the inventory development process ✦ Provisions for the application of the appropriate QA/QC procedures in accordance with any *good practice guidance* agreed by the COP, taking into consideration of the IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories

Box 2. Issues identified and possible courses of action *(continued)*

Missing statistical data and emission factors for key sectors and/or for the estimation of specific greenhouse gases	✦ Provisions for the allocation of the necessary resources to enable collection and publication of statistical data and development of emission factors for identified key sources and/or gases ✦ Provisions for the application of the appropriate procedures for identifying key sectors in accordance with any *good practice guidance* agreed by the COP, taking into consideration the IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories
Need of harmonization and compatibility of statistical data and delays in the availability of statistical publications	✦ Restructuring of the statistical collection system taking into account the specific needs of the national inventory, including timing of submissions
Data confidentiality	✦ Development of the necessary provisions for allowing access to confidential data used in the inventory preparation
Delays in the submission of inventories	✦ Identification of the major factors responsible for delays in the preparation of the inventories and development of an appropriate domestic processes to minimize such delays
Limited or no archiving of information	✦ Development of the appropriate procedures and delegation of the responsibility for archiving all the information, including all statistical data and emission factors necessary to reconstruct a greenhouse gas inventory

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METHODOLOGICAL ISSUES

METHODS AND TOOLS TO EVALUATE IMPACTS AND ADAPTATION

Information on impacts and adaptation assessment methods

Progress report

Note by the secretariat

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I. INTRODUCTION

A. Mandate

1. The Conference of the Parties, by its decision 9/CP.3, requested the secretariat 'to continue its work on the synthesis and dissemination of information on environmentally sound technologies and know-how conducive to mitigating, and adapting to, climate change; for example by accelerating the development of methodologies for adaptation technologies, in particular decision tools to evaluate alternative adaptation strategies'.

2. In response to the above request, an initial compendium of decision tools to evaluate strategies for adaptation to climate change was prepared by the secretariat and made available to the participants at the tenth session of the Subsidiary Body for Scientific and Technological Advice (SBSTA). The SBSTA invited Parties to submit additional information on decision tools and comments on the compendium. It requested the secretariat to facilitate the submission of the additional information electronically on its web site (FCCC/SBSTA/1999/6, para. 55 (b)).

3. At its eleventh session, the SBSTA repeated its invitation to Parties, international organizations and other organizations to submit additional information, particularly on new decision tools, models and methodologies to assess climate change impacts and adaptation, electronically via the web or by facsimile or mail, by 15 February 2000. It requested the secretariat to utilize experts from the UNFCCC roster of experts to review this information, as appropriate. The SBSTA also requested the secretariat to prepare a progress report on this subject for consideration at its twelfth session (FCCC/SBSTA/1999/14, para. 68).

B. Scope of the note

4. This note presents information in response to the above mandate. It summarizes the information on new methods and tools contained in submissions from Parties and organizations. The note also identifies issues regarding further work of the secretariat on impacts and adaptation methodologies. It does not provide a comprehensive analysis of the information submitted on new methods and tools. Parties may also wish to read the submissions from Parties contained in document FCCC/SBSTA/2000/MISC.5.

C. Possible action by the SBSTA

5. The SBSTA may wish to consider the information in this note and provide guidance to the secretariat on the future evolution of the work, particularly on matters related to a process for reviewing the new information using the UNFCCC roster of experts and further development of the database.

6. The SBSTA may also wish to consider whether the general issue of adaptation warrants a more comprehensive approach and, if so, how and when it might be considered by either or both of the subsidiary bodies.

II. BACKGROUND

7. In response to the mandate given at the tenth session of the SBSTA, the secretariat h developed a database and designed web pages to facilitate the transfer of information on me and tools to evaluate impacts and adaptation. The web site also allows interested Parties an organizations to submit the information on new tools, methods and models not included in initial database. An on-line form has been designed to enable the Parties and organizations submit the information in a common format so as to facilitate compilation and access.

8. The secretariat has informed the Intergovernmental Panel on Climate Change (IPCC the availability of the database to and solicited additional information from the lead authors participating in the Third Assessment Report (TAR) of Working Group II (WG II) via the Technical Support Unit of the IPCC WG II.

9. The IPCC is currently synthesizing information on the methodologies and tools to evaluate the impacts of and adaptation to climate change. The TAR, due in 2001, will inclu special chapter which will assess available methods for examining and projecting key aspec the environment, economy and society that are likely to influence current and future vulnerability. It expects, among other things, to provide the information about the adequacy current methodologies as tools for designing adaptation policies. The chapter will also incl information on the applications of decision analysis frameworks to adaptation decisions.

III. SUMMARY OF NEW INFORMATION

A. Coverage

10. The secretariat received 13 submissions, five of them electronically. The submissio were received from two Parties (China and the United States of America), eight non-governmental scientific organizations and one non-governmental environmental organization. Two submissions were made on behalf of two groups of experts: a group of t IPCC WG II lead authors, and a group of experts involved in the United Nations Environme Programme (UNEP) on vulnerability index development. A list of Parties and organization a summary of the information submitted are given in annex I. Submissions from Parties are reproduced in document FCCC/SBSTA/2000/MISC.5.

11. The submissions contained the following: information about new methods and tools evaluate impacts and adaptation; a general overview of tools for evaluating alternative adapt strategies; comments on usage of the methods and tools currently included in the database, a observations regarding possible evolution of the UNFCCC work in the area of synthesis and dissemination of the impacts and adaptation methodologies. Five submissions included supplementary information, such as publications and reports.

B. Information on new methods and tools to evaluate impacts and adaptation

Overview

12. Eight submissions contained information, structured according to the form provided by the secretariat, on 25 new methods and tools for six natural resource and socio-economic sectors. A list of the tools and methods and the scope of their application covered in each sector is provided in annex II.

13. Most of these methods and tools fall into two broad categories. Seventeen of them can be used to evaluate specific adaptation options and/or broad adaptation strategies. The second category contains eight methods that focus more heavily on the assessment of biophysical and socio-economic impacts of climate change in different sectors than on adaptation options and strategies.

14. Most methods and tools are applicable to more than one sector. Five methods and/or tools concerned the agricultural sector and two the water sector; three methods and/or tools support the assessment of impacts and adaptation of coastal zones. Three models address the assessment of impacts and adaptation options in the forestry sector and ecosystems, the sectors which have not been previously included in the database.

15. Seventeen methods and tools have been applied only in a specific region, country or site (for example, agriculture in Africa, the Chinese coast, Canadian farms, etc.). However, most of these methods are reported to be adaptable to other regions. Twenty of the submitted methods and tools do not require extensive technical knowledge of modelling or specific decision-making techniques for use. The use of the remaining models may require particular expertise and skills.

Methods and tools applicable to multiple sectors

16. Fifteen methods and tools which are applicable to multiple sectors, range from general qualitative tools for initial adaptation analysis to the behavioural models, and modelling tools for economic analysis and decision analysis frameworks. In addition, two regional models to predict future climate change are also considered as general tools, as being used in the initial stage of climate change impacts and vulnerability assessment in different sectors.

17. General tools for initial assessment include a number of qualitative methods, such as conceptual frameworks and checklists, for assessing potential adaptation strategies and their main dimensions. An adaptation strategy is defined here, apparent from a specific adaptation option, as broad constructions of learning and monitoring that build capacity to respond to climate change by proposing timely measures.

18. A number of methods of that kind, such as Conceptual Frameworks for Judging Adaptive Capacity, Assessment of Climatic Change and Variability, the Dimensions of Adaptation Model and Risk Management Framework, are used to provide the structure and hypotheses for

numerical impact and risk assessments in the context of the coping capacity of the human systems. The Stakeholder Networks and Institutions Analysis Framework is a qualitative me which is used to evaluate these dimensions of adaptation strategies in the context of changing risk of climate change and variability. The above methods could contribute to the existing database by explicitly including examination of adaptive capacity in the adaptation analysis. Although the methods are best applied during the planning stages of an adaptation study, they can be used in the evaluative stage as well.

19. The Vulnerability Indicators Programme (VIP) and the Agent-Based Social Simulatio models represent a more formal approach to assessing vulnerability and adaptive capacity. T VIP model quantitatively assesses the vulnerability of valued attributes of societies and economies and identifies target vulnerable regions. The second model is used to simulate the behaviour of stakeholder networks to enable the analyst to evaluate different pathways, constructed as the outcome of multiple decisions.

20. A tool for economic and integrated analysis is the Policy Analysis of the Greenhouse Effect model, which treats adaptation as a policy choice to be evaluated on the same basis as mitigation. This model calculates the costs and impacts of policy choices, and evaluates the uncertainty and both economic and non-economic impacts.

21. The Tolerable Windows Approach is a model for a decision-making framework. It applies the principles of the safe minimum standard approach to the climate change problem. Although the model has not yet been used for assessment of adaptation to climate change, it reported to be useful for assessing different climate change policy paths in this area, especially for providing guidance in situations where the applicability of cost-benefit analysis is limited

22. Two Regional Climate Models, the Regional Climate Model over China and the Clim Scenarios/Prediction System, are designed to predict climate change, including extreme even over a regional domain due to both natural and anthropogenic changes. The methods are reported to be useful tools both for assessing future vulnerability across different sectors and making strategy decisions in regard to adaptation to climate change.

Water resources methods

23. The water sector tools described in the submissions represent mathematical models f assessing water resource changes under various hydrological and climate conditions. These models are reported to be useful in evaluating water resource management strategies for adaptation to climate change, and in assessing time-varying changes in the frequency of floo and droughts and their socio-economic consequences across all sectors.

Coastal zones methods

24. Two coastal models aim to assist the user in evaluating the impacts of sea-level rise and storm surges under conditions of climate change along the coasts of China and Australia. Both models can be used to evaluate risks under a range of possible management adaptation options in the regions.

Agricultural methods

25. The agricultural sector tools listed in annex I range from a site-level crop model to the models for analysis of different adaptation options and their characteristics and consequences, both at farm- and at sector-wide levels. Included also is the Process Weather Transfer Tools for Crop: the Chinese Weather Generator, a model which produces input weather data for crop models.

26. The Risk Management Framework is a crop model, which is designed to assess the impacts of various management and natural condition scenarios on crop productivity. The tool is indicated to be helpful in exploring adaptation options and their cost at site level.

27. The Agricultural Adaptation to Climatic Variation and the Relative Risk Index methods represent qualitative tools which examine the driving forces, risks and responses to adaptation. The first model is designed to aid users in evaluating endogenous and exogenous factors that influence adaptation responses and classifies those responses into various farm tactical, and strategic adaptation decisions. The Relative Risk Index method illustrates the overall level of risk, before and after adaptation, a farmer faces in light of various cropping decisions and climatic variations. The method is intended to help in assessing various cropping practices.

28. The method entitled Government Support for Agriculture Losses due to Climatic Variability is a statistical tool designed to describe and evaluate over time the sustainability of government support programmes that are provided in response to climate variability and weather extremes. The methodology could be helpful in assessing different planned adaptation measures.

Natural ecosystems and forestry sector methods

29. Three models included in the natural ecosystems and forestry sections of annex II evaluate the potential impact of climate change on forest and vegetation, and assess different management options. The Climate Vegetation Response Model focuses on analysis of the biophysical impacts of higher carbon dioxide levels and climate change on vegetation of different ecosystems (forests, steppes, deserts, grasslands, etc.). The Process Forest Model: Geographical Information System for the Impact of Climate Change on Forest can be considered as an expert system for examining scenarios of forest development and management under different climate conditions. The models are used for initial vulnerability assessment and defining response adaptation options in the related sectors.

C. Specific issues related to methods and tools

30. The main goal of the work on impacts and adaptation methodologies, as identified mandate, is to promote the exchange of information on the methods and tools. It is anticip that this would assist Parties in applying the best available methods in their vulnerability a adaptation assessments. The activities undertaken by the secretariat have raised a number issues related to further developments towards achieving this goal. These issues are identi below.

31. Comments from a Party and a number of informal comments from organizations a experts suggest that the database developed by the secretariat is useful and that having suc information on the web is helpful. However, the secretariat has received information on s models from only one Party, and from a few other organizations. Until now, submitting information has been a voluntary activity often motivated by a desire of researchers to exc information. One reason for not submitting the information given by other organizations, research institutes, is that they do not have the resources to train individuals from other co who may be interested in using their method. The reason for Parties not submitting inform may be that they simply do not consider information on impact models a high priority. If t wish the secretariat to continue this activity, the following options could be considered to enhance the exchange of information on methods and their applicability:

(a) Amending part II of the guidelines for the preparation of national communi by Parties included in Annex I, to require Annex I Parties to report information according format on the web site;

(b) Encouraging the IPCC to cooperate with the secretariat to produce an exten compendium of methods, for example, those noted in the TAR; and

(c) Conducting a workshop to share experience in using different methods and identify what kind of new information is needed.

32. The comments received from experts and organizations suggest a need to improve quality of information on the methods, by evaluating the methods and by providing more examples of their application. This might make the information more useful to the Parties Parties may wish to consider whether this should be done, and if so, how such improveme should be made. The options that could be considered in this regard include conducting a expert meeting and/or utilizing the roster of experts to evaluate methods and provide more information on their applicability.

33. The exchange of information and the ability to apply impact and adaptation metho linked to the issue of capacity-building. The SBSTA may wish to consider what should be to improve the ability of Parties to use these methods as they draw up a draft framework fo capacity-building activities in accordance with decisions 10/CP.5 and 11/CP.5.

IV. GENERAL ISSUE OF ADAPTATION

34. Methodologies to assess impacts and adaptation options are only one aspect of the broad issue of adaptation. Information on other aspects has been considered by both the subsidiary bodies separately and on different occasions. For example, the secretariat has made available information on coastal zone adaptation technologies (FCCC/TP/1999/1) and the adverse effects of climate change under Article 4.8 (FCCC/SB/1999/2, FCCC/SB/2000/2).

35. Heretofore, most of the attention of the subsidiary bodies has been on issues related to reducing greenhouse gas emissions. Neither subsidiary body has had a broad discussion on adaptation, what aspects should be considered under the Convention or what approaches should be taken to address the issue. Yet, if climate change trends continue, the need for adaptation is likely to increase. The period following COP 6 may be an appropriate time to initiate a more comprehensive approach to this issue, taking into consideration the information likely to be provided in the Third Assessment Report of the IPCC, information in national communications and documents prepared by the secretariat.

Annex I

LIST OF PARTIES AND ORGANIZATIONS AND SUMMARY OF INFORMATION SUBMITTED

Source	Summary of submissions
Parties	
China	Ten models and methods to assess impacts and adaptati options for six sectors, including general tools.
United States of America	A review of decision-making and decision-support tools evaluating alternative adaptation strategies.
Scientific organizations	
Commonwealth Scientific and Industrial Research Organisation (CSIRO) Atmospheric Research, Australia	One model and one tool. General tool for a risk management framework for climate change impact and adaptation assessment; and model for the coastal sector.
Pacific Northwest National Laboratory, USA	General tool to assess adaptation potential and vulnerab
Environmental Change Institute, University of Oxford, UK	Four methods and tools to assess adaptation strategies , with application example for two sectors in Africa.
Judge Institute of Management Studies, University of Cambridge, UK	Model to evaluate adaptation policy choices across all sectors.
Potsdam Institute for Climate Impact Research, Germany	Model to evaluate the long-term climate change policy paths.
University of Guelph, Canada	Three tools to assess impacts and evaluate adaptation responses in agriculture and two tools applicable to mul sectors.
Wesleyan University, USA	Conceptual tool to access adaptive capacity.
Non-governmental environmental organizations	
Bread for the World	A concept for development of a compendium of useful agricultural practices that have proved to combat drough waterlogging problems, which could be used for adapta to climate change in agriculture.
Other	
Group of experts involved in the UNDP programme on vulnerability index development	Comments on the use of the methods and tools currentl the database. Comments on possible further of the data and on the UNFCCC work on impacts and adaptation methodologies.
Group of IPCC lead authors	Comments on the use of the methods and tools currentl the database. Comments on possible further of the data and on the UNFCCC work on impacts and adaptation methodologies.

Annex II

METHODS, MODELS AND TOOLS AND BRIEF DESCRIPTION OF THEIR APPLICATION BY SECTOR[1]

Model, method or tool	Brief description
Methods or tools applicable to multiple sectors	
Agent-Based Social Simulation	A computer programming method to conduct stakeholder and institutional analysis; approach to modelling that seeks to formalize stakeholder rules.
Stakeholder Networks and Institutions Analysis for the Evaluation of Adaptation Strategies	Analytical method for analysis of different stakeholders and institutions in the context of future climate change related risks.
Climatic Change and Variability (CCAV)	A framework for assessment of climate change and variability in the context of the coping capacity of human systems.
Judging Adaptive Capacity	A conceptual framework to initially evaluate planned adaptation in the context of a wide range of plausible scenarios.
Dimensions of Adaptation Model (DAM)	A method representing the major dimensions of adaptation to set a framework for adaptation research.
Regional Climate Model over China (GCM/CN)	A regional numerical climate model to predict climate change, particularly changes in extreme events and climate anomalies, over a regional domain.
Guidelines for the Evaluation of Adaptation Strategies in Agriculture and Water Sector in Africa	A checklist of the factors that form part of a broad evaluation of measures and strategies.
Climate Scenarios/Prediction System	A modelling system to predict regional climate change due to both natural and man-made factors.
Risk Management Framework	Methodology for an environmental risk assessment and management framework for climate change impact and adaptation assessments.
Policy Analysis of the Greenhouse Effect (PAGE)	A computer model for integrated assessment which treats adaptation as a policy choice to be evaluated on the same basis as mitigation.
Tolerable Windows Approach (TWA)	A computer model that applies the principles of the safe minimum standard approach to long-term environmental problems, in particular to the climate change problem, to assess different policy paths.

[1] Only information submitted in accordance with the submission form provided on the secretariat web site is summarized in the table.

Vulnerability Indices	A formal means of assigning priority for the evalua of adaptation strategies.
Vulnerability Indicators Programme (VIP)	A quantitative method to assess the vulnerability of valued attributes of societies and economies.
Water sector	
Flood and Drought Risk Analysis System	A package of mathematical models designed to estimate the time-varying changes in the frequency flood and drought and their socio-economic consequences across all sectors.
Runoff Evaluation System	A software package to assess changes in runoff and water resources and response measures.
Coastal sector	
Predicting Model for Sea Level Change Along the Chinese Coasts	Calculating method to assess the submergible area to sea-level rise.
Storm Surge Heights under Conditions of Climate Change and Sea Level Rise	A quantitative method to evaluate the impact of sea-level rise and storm surges on the coastal area.
Agricultural sector	
Government Support for Agriculture Losses due to Climatic Variability	A quantitative statistical method to evaluate the government supports for extreme weather and clim variability in agriculture over time.
Agricultural Adaptation to Climatic Variation	Computer and numerical model to assess different forces that influence adaptation responses, and to classify those responses into decisions at the farm regional levels.
Chinese Weather Generator (CWG)	A computer program for generating long-series dai weather data to define model parameters for the cr models.
Productivity Function Model	A statistical model to simulate and assess both the effects of changes in natural factors and the effec the different agricultural management measures.
Relative Risk Index (RRI)	A quantitative method to illustrate the relative risk positions of individuals before or after adaptation.

Natural ecosystems	
Historical Disaster Analogue (HDA)	A qualitative tool to assess climate change impacts on ecosystems using historical records of extreme events as analogue of possible future conditions
Climate Vegetation Response Model	A simulating model to evaluate the potential impact of climate change on vegetation types, distribution, area and biomass.
Forestry sector	
Process Forest Model: Geographical Information System for the Impact of Climate Change on Forest	A geographic information system (GIS) based model to assess the changes in forest and different management options.